REMARKS

Claims 1-18 are all the claims pending in the application. In view of the following remarks, reconsideration is respectfully requested.

Claims 1-18 stand rejected under § 103 (a) as being unpatentable over Nakamura et al. (U.S. 6,185,312) in view of Barton (U.S. 6,047,374). Applicants respectfully traverse this rejection on the following basis.

Claim 1 recites the feature of an authentication data embedding portion operable to embed authentication data in transform coefficients of frequency bands exclusive of the MRA among a plurality of frequency bands. Applicants note that the MRA is identified in claim 1 as corresponding to the lowest frequency band among the plurality of frequency bands. Applicants respectfully submit that the cited prior art fails to teach or suggest at least this feature of claim 1.

Regarding this claimed feature, Applicants note that in the response to arguments section of the Office Action (see lines 2-4 on page 3 of the Office Action), the Examiner asserts that Nakamura discloses embedding the authentication data in transform coefficients of a lowest frequency band exclusive of the MRA. Applicants respectfully submit, however, that the Examiner has misinterpreted the language recited in claim 1.

In particular, Applicants note that claim 1 does not recite that authentication data is embedded in transform coefficients of a lowest frequency band exclusive of the MRA, as suggested by the Examiner. Instead, claim 1 recites that the authentication data is embedded in transform coefficients of frequency bands exclusive of the MRA. In other words, according to claim 1, authentication data is embedded in transform coefficients of frequency bands other than (i.e., exclusive of) the lowest frequency band. Thus, as claim 1 clearly identifies the MRA as

corresponding to the lowest frequency band, the Examiner's statement that Nakamura discloses embedding authentication data in transform coefficients of a lowest frequency band exclusive of the MRA is clearly contradictory and is not consistent with language recited in claim 1.

Further, Applicants submit that Nakamura clearly does not disclose or suggest that authentication data is embedded in transform coefficients of frequency bands exclusive of the MRA. Moreover, Applicants submit that Barton fails to cure this deficiency of Nakamura. Accordingly, Applicants submit that claim 1 is patentable over the cited prior art, an indication of which is respectfully requested.

In addition, Applicants note that claim 1 recites the feature of a key data embedding portion operable to embed key data in transform coefficients of a lowest frequency band (i.e., MRA) among a plurality of frequency bands. Moreover, as discussed above, claim 1 recites the feature of an authentication data embedding portion operable to embed authentication data in transform coefficients of the frequency bands exclusive of the MRA among the plurality of frequency bands.

Thus, according to claim 1, a first type of data (i.e., key data) is embedded in transform coefficients of a lowest frequency band (i.e., MRA), and a second type of data (i.e., authentication data) is embedded in transform coefficients of frequency bands other than the lowest frequency band. Applicants respectfully submit that the Nakamura and Barton fail to teach or even remotely suggest this particular combination of features.

Nakamura discloses an apparatus for embedding watermark information in image data (see Figs. 1 and 6). As shown in Fig. 1 of Nakamura, an embedding coefficient-selecting section 13 reads an initial value of a random sequence 31, which is generated by a random-number-

generator 119, and a random sequence is generated by using the initial value of the random sequence 31 (see Fig. 1; col. 5, lines 47-50; and col. 8, lines 45-49).

The random number generator 119 of Nakamura generates one random number for every bit of the watermark information (identified as element 4 in Fig. 1, and as element 104 in Fig. 6) (see col. 8, lines 45-46). The generated random numbers generated for respective bits of the watermark information are then used by an information embedding section (identified as element 12 in Fig. 1, and as element 121 in Fig. 6) to select coefficients in a low frequency domain from among the M x N x T coefficient matrix (see Fig. 6, element 115) to thereby embed the watermark information (14, 104) in the coefficients (see col. 5, lines 51-57; and col. 8, lines 57-67).

As noted above, Figs. 1 and 6 of Nakamura depict an apparatus which embeds watermark information in image data. Fig. 3 of Nakamura, on the other hand, depicts an apparatus which reads the embedded watermark information (see col. 6, lines 16-18). In particular, in Fig. 3 of Nakamura, the initial value of the random sequence 31, which is used at the time of embedding the watermark information (as described above with respect to Figs. 1 and 6), is read by an embedding coefficient selecting section 22, and a random sequence is generated by using the initial value of the random sequence 31 (see col. 6, lines 32-36).

Next, in Nakamura, coefficients from which the watermark information 4 will be read are determined using the random sequence in the embedding coefficient selecting section 22 (see col. 6, lines 36-40). Finally, an information reading section 24 reads each bit of the embedded watermark information 4 from the obtained coefficients, and the embedded watermark information is output (see col. 6, lines 51-54).

Thus, in Nakamura, while random numbers are generated which are used to select coefficients to which watermark information will be embedded, there is absolutely no teaching or suggestion in Nakamura regarding embedding a first type of data (i.e., key data) in transform coefficients of a lowest frequency band (i.e., MRA) among the plurality of frequency bands, and embedding a second type of data (i.e., authentication data) in transform coefficients of the frequency bands other than the lowest frequency band.

Indeed, Applicants respectfully submit that Nakamura fails to even explicitly mention data being embedded in transform coefficients of a lowest frequency band. In making the rejection, it appears as though the Examiner may be relying on disclosure in Nakamura which sets forth that the "information-embedding-section 121 selects one coefficient ... in a low frequency domain from amongst the M x N x T coefficient matrix" (emphasis added) (see col. 8, lines 62-64).

However, Applicants respectfully point out that this disclosure in Nakamura merely indicates that all of the coefficients in Nakamura to which the watermark information is to be embedded are selected from a low frequency domain. As described at col. 52, lines 3-8, Nakamura embeds the watermark information in coefficients in a low frequency domain because such an area is not susceptible to influence from information compression, and therefore, reading of the embedded watermark information 4 can be reliably carried out (see col. 52, lines 3-8).

Thus, while Nakamura discloses embedding watermark information in coefficients of a low frequency domain, there is absolutely no discussion regarding a first type of data (i.e., key data) being embedded in coefficients of a lowest frequency band among a plurality of frequency bands, and a second type of data (i.e., authentication data) being embedded in coefficients of

frequency bands other than the lowest frequency band.

If the Examiner maintains the rejection of claim 1, Applicants respectfully request the Examiner to explain with particularity what data in Nakamura is being interpreted as the "key data", and how Nakamura is being interpreted as embedding such key data in a lowest frequency band of a plurality of frequency bands. Applicants kindly request this explanation from the Examiner so that Applicants may make an informed decision with regard to appeal.

Regarding Barton, Applicants respectfully submit that Barton fails to cure the deficiencies of Nakamura as discussed above. In particular, Applicants submit that Barton merely discloses an apparatus for authenticating digital data by providing an authentication stamp that is embedded into a digital block (see col. 5, line 66 - col. 6, line 5).

In addition, claim 1 recites the feature of an authentication data generation portion operable to generate a pseudo-random series by using predetermined key data. Regarding this feature, the Examiner cites to col. 5, lines 42-55 and to the initial value of the random sequence 31 as shown in Fig. 3. Initially, Applicants note that the description at col. 5, lines 42-55 refers to Fig. 1, which depicts the apparatus for embedding the watermark information, and that Fig. 3 depicts the apparatus for reading the embedded watermark information.

Nonetheless, based on the Examiner's comments in the Office Action, it appears as though the Examiner is relying on the disclosure in Nakamura at col. 5, lines 48-51, which sets forth that the initial value of the random sequence 31 is read by the embedding coefficient selecting section 13 and a random sequence is generated by using the initial value of the random sequence 31.

Thus, as claim 1 recites that a pseudo-random series is generated by using predetermined

key data, it appears as though the Examiner is asserting that the initial value of the random sequence 31 corresponds to the "key data" as recited in claim 1. Applicants kindly request the Examiner to confirm whether the initial value of random sequence 31 is being interpreted as corresponding to the "key data" as recited in claim 1.

If the Examiner is asserting that the initial value of the random sequence 31 corresponds to the "key data", then Applicants respectfully submit that Nakamura clearly does not teach or suggest the above-noted feature of a key data embedding portion operable to embed the key data in transform coefficients of a lowest frequency band. That is, in Nakamura, the initial value of the random sequence 31 is clearly not embedded in transform coefficients. Instead, the initial value of the random sequence 31 is merely used to select which of the coefficients will be embedded with the watermark information 4.

In view of the foregoing, Applicants submit that claim 1 is patentable over the cited prior art, an indication of which is respectfully requested.

Further, claim 1 recites that the authentication data is generated from a pseudo-random number series. As noted above, the Examiner is relying on the disclosure of Nakamura at col. 5, lines 48-51 for the generation of a random sequence of numbers. Further, Applicants note that the Examiner is relying on Barton for the teaching of authentication data. However, Applicants respectfully submit that there is absolutely no teaching in the cited references that would suggest to one of ordinary skill in the art that it would have been desirable to generate the authentication data of Barton from the pseudo-random number series of Nakamura.

In particular, as noted above, the random sequence generated in Nakamura is used to select coefficients to which the watermark information 4 will be embedded. Accordingly, as

Nakamura provides watermark information to be embedded in coefficients, Applicants respectfully submit that there is no reason that one of ordinary skill in the art would use the random sequence of Nakamura to generate authentication data, as suggested by the Examiner in the Office Action.

That is, because Nakamura plainly discloses the use of watermark information 4 which is embedded in the coefficients, Applicants respectfully submit that the Examiner's statement that it would have would have been obvious to generate the authentication data of Barton to embed in the coefficients of Nakamura is simply not convincing.

In other words, as the watermark information 4 of Nakamura is embedded in the coefficients to prevent illegal copying (see col. 52, lines 51-60), one of ordinary skill in the art would clearly see no need to generate the authentication data of Barton to be embedded in the coefficients. Indeed, incorporating such a feature in Nakamura would plainly be redundant and would serve no apparent purpose because the watermark information 4 is clearly disclosed in Nakamura as being embedded in the coefficients for security purposes.

Moreover, Applicants note that there is absolutely no teaching or suggestion in Barton that the authentication data disclosed therein could be generated based on a value, such as a pseudo-random number.

Accordingly, if the Examiner maintains the rejection of claim 1, Applicants respectfully request that the Examiner specifically explain why and how one of ordinary skill in the art would generate the authentication data of Barton to be embedded in coefficients of Nakamura, taking into consideration that Nakamura clearly provides watermark information that is embedded into coefficients for security purposes.

In view of the foregoing, Applicants respectfully submit that the cited prior art fails to disclose, suggest or otherwise render obvious all of the features of claim 1. Accordingly, Applicants submit that claim 1 is patentable over the cited prior art, an indication of which is respectfully requested. Claim 2 depends from claim 1 and is therefore considered patentable at least by virtue of its dependency.

In addition, Applicants note that claim 2 recites that the authentication data embedding portion embeds the authentication data in each transform coefficient of the MRR by comparing an absolute value of the transform coefficient with a set value T, and if the absolute value is less than the set value T, setting the transform coefficient to the set value +m or -m depending on a bit value of the authentication data to be embedded, and if the absolute value is not less than the set value T, setting the transform coefficient to an even or odd integer near to the value q depending on the bit value of the authentication data to be embedded.

The Examiner alleges in the Office Action that Nakamura discloses such a feature and references Figs. 2, 17 and 48; col. 18, lines 9-57; col. 35, line 25 - col. 37, line 38; col. 1, line 65 - col. 2, line 18; and col. 7, line 55 - col. 8, line 28 in support thereof. Applicants respectfully submit that the figures and sections of the specification cited by the Examiner do not disclose or suggest the above-noted feature recited in claim 2.

For example, Nakamura makes no mention of comparing an absolute value of the transform coefficient with a set value T, and setting the transform coefficient to +m or -m, or an even or odd integer depending on the result. If the Examiner maintains the rejection of claim 2, Applicants request that the Examiner specifically point out the column and line number of Nakamura that discloses this feature, and explain how such disclosure corresponds to the above-

noted feature in claim 2.

Moreover, Applicants submit that Barton fails to cure this deficiency of Nakamura. In view of the foregoing, Applicants submit that claim 2 is patentable over the cited prior art, an indication of which is respectfully requested.

Regarding claim 3, Applicants submit that this claim is patentable over the cited prior art for at least similar reasons as discussed above with respect to claim 1.

For example, claim 3 recites the features of a key data extraction portion operable to extract key data embedded by a specific apparatus from transform coefficients of a lowest frequency band among a plurality of frequency bands (i.e., MRA); an authentication data generation portion operable to generate a pseudo-random series by using the key data, and to generate authentication data from the pseudo-random number series; and an embedded information extraction portion operable to extract embedded information embedded based on the key data by the specific apparatus from transform coefficients of frequency bands exclusive of the MRA among the plurality of frequency bands.

Accordingly, for at least similar reasons as discussed above with respect to claim 1, Applicants submit that the combination of Nakamura and Barton fails to disclose, suggest or otherwise render obvious such features. Thus, Applicants submit that claim 3 is patentable over the cited prior art, an indication of which is respectfully requested.

Claims 4-6 depend from claim 3 and are therefore considered patentable at least by virtue of their dependency. In addition, regarding claims 5 and 6, Applicants submit that these claims are patentable for at least similar reasons as discussed above regarding claim 2.

Regarding claims 7 and 13, Applicants submit that these claims are patentable over the

cited prior art for at least similar reasons as discussed above with respect to claim 1.

For example, claims 7 and 13 recite the features of generating a pseudo-random number series by using predetermined key data, and generating authentication data from the pseudo-random number series; embedding the key data in transform coefficients of a lowest frequency band (i.e., MRA) among a plurality of frequency bands; and embedding authentication data in transform coefficients of frequency bands exclusive of the MRA among the plurality of frequency bands.

Accordingly, for at least similar reasons as discussed above with respect to claim 1, Applicants submit that the combination of Nakamura and Barton fails to disclose, suggest or otherwise render obvious such features. Thus, Applicants submit that claims 7 and 13 are patentable over the cited prior art, an indication of which is respectfully requested.

Claim 8 depends from claim 7, and claim 14 depends from claim 8. Accordingly, Applicants submit that these claims are patentable at least by virtue of their dependency. In addition, Applicants submit that claims 8 and 14 are patentable for at least similar reasons as discussed above regarding claim 2.

Regarding claims 9 and 15, Applicants submit that these claims are patentable over the cited prior art for at least similar reasons as discussed above with respect to claim 1.

For example, claims 9 and 15 recite the features extracting key data embedded by a specific apparatus from transform coefficients of a lowest frequency band (i.e., MRA) among a plurality of frequency bands; generating a pseudo-random series by using the key data, and generating authentication data from the pseudo-random number series; and extracting embedded information embedded based on the key data by the specific apparatus from transform

coefficients of frequency band exclusive of the MRA among the plurality of frequency bands.

Accordingly, for at least similar reasons as discussed above with respect to claim 1, Applicants submit that the combination of Nakamura and Barton fails to disclose, suggest or otherwise render obvious such features. Thus, Applicants submit that claims 9 and 15 are patentable over the cited prior art, an indication of which is respectfully requested.

Claims 10-12 depend from claim 3, and claims 16-18 depend from claim 15. Accordingly, Applicants submit that these claims are patentable at least by virtue of their dependency. In addition, regarding claims 11, 12, 17 and 18, Applicants submit that these claims are patentable for at least similar reasons as discussed above regarding claim 2.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may best be resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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